

Name: _____

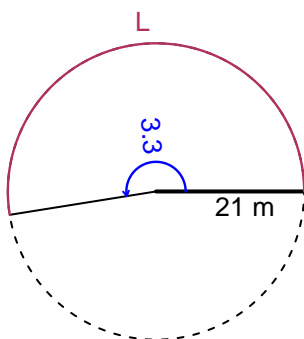
Date: _____

Trig Final (SLTN v691)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 21 meters. The angle measure is 3.3 radians. How long is the arc in meters?

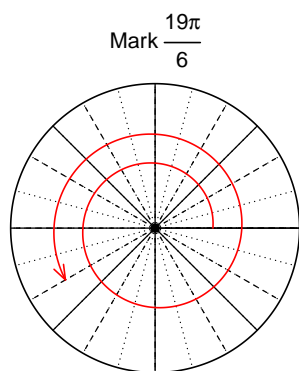


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$L = 69.3$ meters.

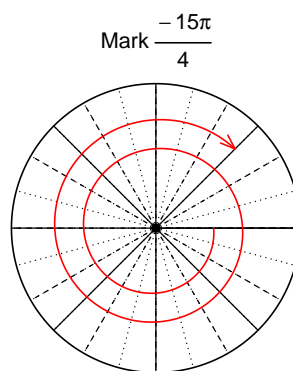
Question 2

Consider angles $\frac{19\pi}{6}$ and $-\frac{15\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{19\pi}{6}\right)$ and $\cos\left(-\frac{15\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(19\pi/6)$

$$\sin(19\pi/6) = -\frac{1}{2}$$



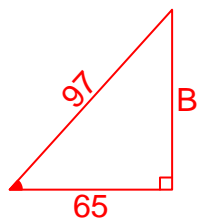
Find $\cos(-15\pi/4)$

$$\cos(-15\pi/4) = \frac{\sqrt{2}}{2}$$

Question 3

If $\cos(\theta) = \frac{65}{97}$, and θ is in quadrant IV, determine an exact value for $\tan(\theta)$.

Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



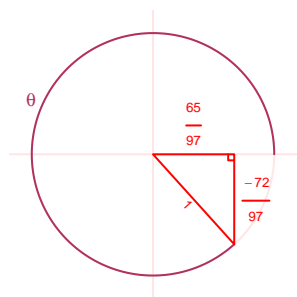
Solve the Pythagorean Equation

$$65^2 + B^2 = 97^2$$

$$B = \sqrt{97^2 - 65^2}$$

$$B = 72$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\tan(\theta) = \frac{\frac{-72}{97}}{\frac{65}{97}} = \frac{-72}{65}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 8.63 Hz, an amplitude of 5.62 meters, and a midline at $y = -6.72$ meters. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -5.62 \cos(2\pi 8.63t) - 6.72$$

or

$$y = -5.62 \cos(17.26\pi t) - 6.72$$

or

$$y = -5.62 \cos(54.22t) - 6.72$$